

Project Description

V. 2013.04.10

The objective of this project is to use Landsat satellite imagery to develop georeferenced rasters that show the location of clear cut harvests for each of the study watersheds during the years benthic macroinvertebrate samples were collected.

The initial project tasks include selecting an appropriate methodology, documenting the methodology step by step, and demonstrate the use of the methodology from beginning to end on at least two landsat imagery scenes. If time and resources allow, the remainder of the project tasks are to process the landsat imagery for the remainder of the study areas and years.

A. Selecting, documenting, and demonstrating the methodology step by step

There are a number of methodologies in the published literature demonstrating how to use landsat imagery for disturbance detection including Cohen et al 1998, Healy et al 2005, and Masek 2007. The tasks include:

1. Reviewing relevant literature and selecting an efficient and accurate methodology (may include multiple methods) appropriate to identify areas of clear cut harvests in the coastal regions of the Pacific Northwest over the twenty- one year time span (1998-2009) for which clear-cut data must be developed.
2. Produce a methods document that describes step by step the entire process starting from image acquisition and the appropriate satellite products to download, to image processing, to final raster mosaic showing location of clear-cut harvests over the study area.

ESRI ArcGIS 10.1 software package (which may include python scripts) or R statistical software shall be the primary software used to process all images and generate final raster files. A process that utilizes R or python scripting is preferred but not necessary. Any python or R scripting code shall be documented to correspond with the appropriate step in the methods document. Each step in the methods document shall include a brief summary of that step, the name or description of any processing tool/method used, relevant equations, input commands, coefficients, journal references, or other important information including pictures or screenshots that clearly describe how to implement that step.

The methods document shall also briefly describe any relevant considerations, limitations, or advantages to the selected methods and data used.

3. Demonstrate the selected method from beginning to end on two Landsat images from the year 2011 on the following scenes:
 - Path 46, Row 29 (WRS2 descending)
 - Path 46, Row 30 (WRS2 descending)

The final product shall result in a single raster mosaic of both images.

4. Provide deliverables that shall include:
 - a. The methods document as a Microsoft word and a PDF file.
 - b. All R or python scripts used.
 - c. Beginning Landsat scene images and metadata as acquired from USGS/NASA.
 - d. Final georeferenced raster mosaic showing locations of clear cut harvests.

B. Processing the rest of the imagery

1. The final task is to process the images using the methods and steps described in part A. The following landsat scenes will be processed for the following years:

WRS2 Descending Path and Row	Years
Path 46, Row 29	2011, 2012
Path 46, Row 30	2009, 2011, 2012
Path 47, Row 29	2009

2. Provide deliverables that shall include:
 - a. Beginning Landsat scene images and metadata as acquired from USGS/NASA.
 - b. Final georeferenced raster mosaic showing locations of clear cut harvests.

References

Cohen, W. B., Fiorella, M., Gray, J., Helmer, E., & Anderson, K. (1998). An efficient and accurate method for mapping forest clearcuts in the Pacific Northwest using Landsat imagery. *Photogrammetric Engineering and Remote Sensing*, 64(4), 293– 300.

Healey, S., W.B.Cohen, Y. Zhiqiang, O. Krankina, Comparison of tasseled cap-based Landsat data structures for use in forest disturbance detection, 2005, submitted to: *Remote Sensing of the Environment*. 97(3): 301-310.

Masek, J.G. 2007. LEDAPS disturbance products: user's guide and algorithm description (V.2 – August 2007). http://ledaps.nascom.nasa.gov/docs/pdf/LEDAPS_DI_ATBD.pdf